

XV.—*Further Notes on British Zoophytes, with descriptions of new Species.* By the Rev. THOMAS HINCKS, B.A.

[With two Plates.]

It is with peculiar pleasure that I have to record the discovery of two new species of the beautiful genus *Campanularia* in the British Seas. The first which I shall describe is allied to the *Campanularia Syringa* and the *C. dumosa*, and belongs to the section of the genus which is distinguished by the "dense corneous texture" of the cells and the shortness of the pedicle. The only specimen which I have yet seen occurs on a fragment of *Nitophyllum* from the north of Ireland, and was sent me for description by my father, Professor Hincks of the Queen's College, Cork.

GENUS CAMPANULARIA.

i. *C. parvula* (Hincks).

Stem creeping; cells very minute, on short ringed stalks, campanulate, the aperture entire.

The creeping stem is of great delicacy, and forms a rude kind of network over the surface of the weed. The cells are exceedingly minute, campanulate, of equal width throughout till within a short distance of the base, when they are abruptly rounded off; of a somewhat dense, corneous structure, and mounted on very short stalks, composed of about four rings. The aperture is truncate and the margin plain.

This pigmy species is, I believe, the smallest of the 'Bell-corallines,' and there is no other British form with which it can be confounded. The shape of the cell is very distinctive, and is well preserved in dried specimens.

Hab. Weed from the north of Ireland (Plate V. A.).

ii. *C. caliculata* (Hincks).

Stem creeping, filiform; cells on rather thick crenated stalks, campanulate, having an interior cup which contains the body of the polype, and is prolonged below into a tubular case, which pervades the pedicle and envelopes the medullary pulp; rim entire.

This very beautiful and interesting species was first obtained by Mr. R. S. Boswell, lately of Ramsgate, from Pegwell Bay. In the course of the past summer this gentleman showed me a specimen of it, amongst some other zoophytes, exquisitely mounted according to a peculiar method of his own, and expressed an opinion that it was new, an opinion in which I was much inclined to agree with him. Within the last few weeks my friend Richard

Allman, Esq. of Bandon has supplied me with abundant specimens of a *Campanularia* from the coast of Ireland, which, to my no small delight, has proved to be identical with Mr. Boswell's species. A careful examination of these has fully convinced me that this elegant form can be referred to none of the species hitherto described as British.

The remarkable peculiarities of internal structure are in themselves sufficiently distinctive. The double cup and the inner casing of the medullary pulp are, so far as I know, unique. But there are also other important characters which separate it from *C. integra*, its nearest ally.

From the creeping stem of *C. caliculata*, which spreads, in the specimens I possess, over one of the red sea-weeds, rise at intervals crenated pedicles, bearing campanulate cells, which, instead of being wide and basin-shaped like those of *C. integra*, are rather in the form of a wine-glass. They are perfectly transparent and have the rim entire. Within is a second cup of most graceful form, resembling an inverted hand-bell, in which the body of the polype is lodged. This inner cup, the walls of which are continuous *above* with those of the cell itself, is produced below into a tubular sheath, which encases the medullary pulp throughout its entire length, and is crenated like the stalk. I have likened the inner cup to an inverted hand-bell, and the resemblance is very striking; for one segment of the crenated sheath, mentioned before, is always included within the *outer* cup, so as to represent the *handle* of the bell.

The stalks which support the cells are very constant in their characters. Amongst a great number examined, I have met with scarcely any variation. They are somewhat thick in proportion to their length, and are composed for the most part of about nine or ten crenations, of which the one immediately below the cell is always the smallest. Like the cells they are double throughout, as is also the creeping stem. Throughout the entire structure there is an inner envelope which immediately surrounds the animal substance, and which is very distinctly visible when the polype and the pulp have perished.

Mr. Boswell, who had the pleasure of examining the polypes when alive, informs me that they are "exceedingly opaque and the tentacles rather small."

A mere description, however faithfully it may give the characters, can hardly do justice to the beauty of this interesting species. This want however is supplied by Mr. Tuffen West's expressive drawing, than which nothing could be more true to the original (Plate V. B.).

Hab. Discovered by Mr. R. S. Boswell in Pegwell Bay. Near the Old Head of Kinsale, County Cork, R. Allman, Esq.

I may here mention a marked variety of *Campanularia volubilis*, of which I have seen specimens from the west of England, obtained by Mr. W. Templer. This species, in its ordinary state, has the rim of the cells cut into sharply-pointed and deep segments. The crenations terminate acutely. In the variety to which I refer, the margin is cut in a somewhat castellated fashion, the crenations being shallow and square-topped. So they are represented in the figure of *C. volubilis* in Van Beneden's 'Mémoire sur les Campanulaires,' a figure which differs widely from that of the same species in Dr. Johnston's work. In other respects the English variety agrees with neither of the figures. The cells are wide, and lined at regular intervals, longitudinally; the stalks of great length, of a greyish colour, semi-opaque, and of much coarser texture than those of the normal *volubilis*. There are one or two *annuli* just below the cell, but otherwise the pedicle is generally destitute of rings.

CORDYLOPHORA LACUSTRIS.

The discovery of this zoophyte in some of the London docks has removed the apprehensions of collectors consequent on the destruction of the old canal-boat from which it was first obtained by Professor Allman, and has afforded opportunities of studying more thoroughly its structure and physiology. The following notes are offered as a contribution to its history.

In September last I procured fine specimens of the *Cordylophora*, some of which are still living in my possession, and have produced several crops of polypes within the time. The polypes soon perish and are soon reproduced. They do not drop off, like the heads of *Tubularia*, but would seem to be destroyed by a process of *absorption*. On one occasion a fine polype in full health and vigour, which I had been watching for some time, was observed suddenly to contract all its *tentacula*, which became perfectly rigid and motionless. Meanwhile a strange ferment was perceptible within the cavity of the stomach. A dense fluid filled it, which was constantly flowing round the interior, and in this granules of various sizes and in great number were to be seen in restless motion, hurrying here and there, some just entering the stomach, and others hastening towards the entrance of the canal which traverses the polypidom. Within the latter a like activity prevailed. While this unusual ferment was proceeding the arms were gradually shortening, until at length they appeared as trifling inequalities on the surface of the body. The latter also lost its characteristic shape and became contracted in its dimensions, and was finally represented by a slight enlargement at the extremity of the medullary pulp, which had receded

some way within the horny tube. The polype in short had been absorbed. Many similar cases have occurred to me.

The newly-formed polypes are of a most delicate whiteness, and are beautiful objects, especially when they appear on an old and worn polypidom, reminding one of frail blossoms bursting forth from a bare and rugged stem. They are developed at the ends of the branches and are non-retractile. The body is more or less ovoid, and is produced above into a kind of snout which bears the mouth. This portion is capable of much elongation and contraction, and possesses great mobility. From the peculiar *lined* appearance which it presents in certain lights, I am inclined to believe that it is furnished with an apparatus of muscles. The mouth is connected by a short passage with the stomach. This organ is a well-defined cavity, elongate-oval in form, which tapers off below, and is prolonged into a canal which passes down the centre of the pulp. This canal like the stomach itself is very clearly defined. The polype-head is supported on a fleshy neck, to the base of which the horny polypidom extends.

The walls of the stomachal cavity and the central canal are covered with a complicated web of anastomosing vessels, from which simple vessels seem to pass off to the sides. This vascular structure is, so far as I know, unique amongst the Hydroid Zoophytes, and it gives a very marked and peculiar appearance to the polypes of the *Cordylophora*.

The arms are scattered over the body, filiform, and roughened with granules, which are arranged in regular nodules. They present a very interesting structure. They are distinctly tubular and prettily encircled at intervals by rings, which are no doubt muscular bands, and which are all connected together by longitudinal fibres, running the entire length of the arm, and prolonged at the base into the body. Upon this structure is dependent, in great part, the remarkable power which the polype possesses of elongating and shortening its tentacles. At times they are so much extended as considerably to exceed the entire body in length, and in this state are attenuated into most delicate filaments. When contracted they appear corrugated and comparatively thick, and the muscular rings are pressed together. I have seen the arms, when extended, fully six times as long as in their contracted condition.

The polype of the *Cordylophora* is a singularly beautiful object when its tentacula (some twelve or fourteen in number) are all elongated, floating like slender threads through the water, and waving to and fro with its every slightest movement.

REPRODUCTION OF CORDYLOPHORA.

The *Cordylophora* is propagated, like the *Sertularian* zoo-

phytes, by means of *planulae* (motive buds), which are matured in deciduous vesicles. These are oval and are produced on the polype-bearing branches. They consist of a thin corneous envelope with a soft mucous lining of some thickness, enclosing a central cavity in which the reproductive bodies are contained. In an earlier stage of development, the interior is occupied by a mass of granular matter surrounded by a delicate membrane. At first the vesicle appears as a small transparent oval case, budding from the branch, into which an offshoot from the fleshy axis of the polypidom has penetrated. Gradually it increases in size, and after a while the contained mass is resolved into a number of round bodies, which lie clustered together within the membranous sac, a stump of the offshoot remaining at the bottom of the vesicle. I have counted as many as twelve of these bodies in a single capsule, but more commonly they amounted to six or eight in number. For some time they undergo apparently but little change, merely increasing in size. At length however a marked alteration in form takes place. They become first oval, then elongate, and are now prepared to issue from the capsule as *planulae*. This change occupies two or three days. When on the point of escaping they are found clustering together at the upper part of the vesicle.

I was fortunate enough to witness the exodus of a whole company of these embryo *Cordylophorae*. As there is no natural opening to the vesicle, as amongst the Sertularians, a passage has to be made through the soft external covering. This was effected by one of the *planulae*, which acted as a pioneer, and slowly, and with some difficulty, as it seemed, worked its way into the surrounding water. As soon as the leader had escaped the others followed in succession, and with great ease and rapidity,—with the exception of one, which happening to have the portion of its body representing a head turned in the wrong direction, moved towards the bottom of the vesicle instead of towards the water, and was some time in finding the right road and following its companions.

On reaching the water the *planula* remains inactive for a few seconds, undergoing remarkable changes of shape; the body then acquires a rotatory motion, and it sails off with considerable rapidity. It is elongate, and leech-like in form, somewhat broader at one extremity than the other, white, opaque in the centre, and semitransparent towards the edge of the body.

The *planulae* made their escape late in the evening, and on the following morning some of them had become attached. They fix themselves by one extremity, which expands into a roundish disc, the body itself standing erect in the centre of it. This gradually assumes the form of the polype, the upper portion

becoming somewhat ovoid and pointed above. Three or four tentacles also sprout from it, while the horny polypidom forms round the lower part, crenated or ringed, as it always is towards the base of the polype-bearing branches. When the stem has reached a certain height, it swells out into small protuberances here and there, which soon develop themselves into fresh polypes.

I have seen a *planula* apply one end of its body to the bottom of the watch-glass in which it was kept, and then revolve on its axis for a minute or two; and no doubt it is in this way that attachment is effected.

Besides the vesicles in which the *planulae* are produced, other bodies occur at times on the *Cordylophora* in considerable numbers, which call for some notice. These are elongate, and often pointed at the apex, opaque white and of varying figure (Plate VI. fig. 2). They spring from the branches and are supported on short stalks. They consist of an opaque mass of granular matter, surrounded by a delicate and perfectly transparent corneous envelope, and are developed into polypes. I have seen rudimentary tentacles sprouting from them, but have not watched the course of development. These buds were present in great numbers along with the vesicles, but disappeared as the season advanced.

Though much attenuated, there can be little doubt that the corneous skin encloses the body of the fully-developed polype.

It will be at once evident that *Cordylophora* presents us with a somewhat strange assemblage of characters. Its embryology, as now determined, separates it from the *Tubularina* with which it has hitherto been associated. It has no tentacular ovisacs, and its *planula* resembles that of the *Sertulariadae*.

Its extensible, muscular and roughened arm is that of a *Hydra* rather than a *Tubularian*. Its naked polype and the arrangement of its tentacula are points of difference between it and the *Sertulariadae*, while its vascular system (whatever be its precise nature) is perhaps unique. Nor must we omit to note its well-defined digestive cavity. In external character it is for the most part a Tubularian zoophyte; in embryology it is rather a Sertularian, and there would seem to be points in which it differs from both (Plate VI. figs. 1, 2).

Additional Note on Cordylophora.—On one occasion, in removing a piece of the *Cordylophora* from one glass to another, a polype-head was accidentally detached. In a short time the wound caused in it by the separation had healed, and the base had assumed somewhat of a bulbous form. In this free condition the detached head continued for (I think) a day or two. At the end of that time I found that it had attached itself to the watch-glass, and soon after a new branch began to shoot

from its *base*. As the latter increased, the polype exhibited the appearance which precedes *absorption*; the arms became contracted and rigid, and at length almost disappeared. At the same time a dense fluid filled the interior, in which an extraordinary ferment was perceptible. Numbers of spherical bodies, most of them opaque, as if laden with matter, might be seen bustling to and fro, and hurrying down the central channel, which communicated with the new offshoots, into which they penetrated. The process of absorption proceeded until the original polype-head had altogether vanished, its substance having gone to build up the new stem, which had now attained a considerable length. The destruction of the specimen put an end to my observations, but there can be no doubt that a polype would soon have been produced at the extremity of the shoot.

A polype, then, artificially detached from the *Cordylophora* is capable of originating a new organism. It may be likened to a precocious *planula*. It is in fact a bud which has been developed into the polype form while in connection with the parent structure, while the *planula* is a bud which has become free, before assuming that form.

MIMOSELLA GRACILIS.

Since I first described this beautiful production in the 'Annals,' I have had the satisfaction of dredging it in some abundance in Torbay. It occurred here, as in Salcombe Bay, where it was originally obtained, on rocky ground at a short distance from the shore, and was always, I think, parasitical on the same weed. Mr. W. Templer has also procured a specimen which was cast on the Plymouth Breakwater after a gale of wind. The species therefore would seem to be pretty generally distributed along the western coast.

A renewed examination of the *Mimosella* in its living state enables me to add a few words on its peculiar habits.

The movement of the cells always accompanies either the retraction or expansion of the polype. When the polypes on both sides of a pinna are withdrawn, the cells are all folded together, like the leaflets of the *Mimosa* when touched. But each one of them when about to issue throws back its cell, and then immediately darts forth. When it retreats, the cell returns to its former position.

Great numbers of pinnæ were met with covered with budding polype-cells in various stages of development. They appear at first as small, roundish excrescences on the branch.

EUCRATEA CHELATA.

One of the leading characters of the family of *Eucratiadæ*, as constituted by Dr. Johnston, is the absence of "external ovarian

